

CLAIMS:

1. A intrinsically gel-free, randomly branched polyamide comprising at least units derived from:

1. AB monomers, which monomers have both a carboxylic group (A) and an amine group (B),

2. at least one compound I, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 2$  or an amine ( $B_w$ ) having a functionality  $w \leq 2$ ,

3. at least one compound II, being a carboxylic acid ( $A_v$ ) having a functionality  $v \geq 3$  or an amine ( $B_w$ ) having a functionality  $w \geq 3$ , compound II being a carboxylic acid if compound I is an amine or compound II being an amine if compound I is carboxylic acid if compound I is an amine or compound II being an amine if compound I is a carboxylic acid, characterized in that the amounts of units derived from all carboxylic acids and amines in the polyamide satisfy formula a

$$P < 1 / [(F_A - 1) (F_B - 1)] \quad (1)$$

where

$$P = [\sum (n_i f_i)]_x / [\sum (n_i f_i)]_y \quad (2)$$

where  $P \leq 1$  and either  $X = A$  and  $Y = B$ , or  $X = B$  and  $Y = A$ , and

$$F_x = \sum (n_i f_i^2) / \sum (n_i f_i) \quad (3)$$

for, respectively, all carboxylic acids ( $X = A$ ) and all amines ( $X = B$ ),

where  $f_i$  is the functionality of either the carboxylic acid ( $f_i = v_i$ ) or amine ( $f_i = w_i$ ),  $n_i$  being the number of moles of the carboxylic acid or amine and the summation involving all units derived from carboxylic acids and amines in the polyamide except:

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Sub A1

Sub A2

carboxylic acids ( $A_v$ ) having a functionality  $v$  and amines ( $B_w$ ) having a functionality  $w$ , in the following amounts (in  $\mu\text{mol/g}$  of polyamide):

- $B_1$  (20),  $B_3$  (60) and  $A_2$  (20)
- $B_1$  (10),  $B_3$  (60) and  $A_2$  (30)
- $B_1$  (120),  $B_2$  (30) and  $A_3$  (60)
- $B_1$  (150),  $B_2$  (30) and  $A_3$  (70)
- $B_1$  (170),  $B_3$  (30),  $A_2$  (60) and  $A_3$  (60).

2. The polyamide according to claim 1, the functionality of compound wherein I can be chosen from 2, 3, 4, 5 and 6 and the functionality of compound II can be chosen from 3, 4, 5 and 6.
3. The polyamide according to claim 1, the functionality of wherein compound I is 2 and the functionality of compound II is 3.
4. The polyamide according to claim 3, wherein at least a unit derived from monofunctional carboxylic acid or amine is present.
5. The polyamide according to claim 3, wherein compound I is chosen from the group formed by terephthalic acid and 1, 6-hexa-methylene diamine.
6. The polyamide according to claim 3, wherein compound II is chosen from the group formed by 1, 3, 5-tris (caproic acid) – melamine, trimesic acid and bis (hexamethylene triamine).
7. The polyamide according to claim 1 wherein the AB monomer is an  $\alpha$ ,  $\omega$  – amino acid and/or a lactam.
8. The polyamide according to claim 7, wherein the lactam is  $\epsilon$ -caprolactam.

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Sub AB

Sub AY

Sub A4

9. A process for the preparation of a polyamide film, wherein a polyamide according to claim 1 is chosen as polyamide.
10. A fiber, film, foam or molded article obtained from polyamide according to claim 1.
11. A flat film obtained from a polyamide according to claim 1.

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